The Effectiveness of using oranges to delay fatigue appearance and improve the skill level of swimming specialized students

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Introduction and Research Problem:
Swimming is considered one of the types of water sports that have a great importance, where scientists, doctors and sports leaders agreed that swimming is an outstanding sport. This prestigious status is due to the various physical, psychological and social values that its practitioners gains. Sports physiologists' shows great interest in swimming, in order to study the training methods that can be used to achieve the physiological responses necessary to adapt with the exerted effort, increase the body's functional efficiency and improve the metabolism to achieve the best results. Swimming requires proper nutrition to ensure energy production, meet dietary needs and allow muscles recovery between and during performing exercises. The recovery by nutrition works by restoring tissues and compensating fuel by compensating muscle glycogen and protein (1: 6, 187) (8: 166)
Muscle contraction may require energy, which either may be fast meaning without oxygen use or less speed with the use of oxygen, but the production of any energy needs to have an operating system, and therefore some of the waste in the muscle lags behind the energy production and may be causing fatigue and low performance level in swimming. (1: 14, 15) (8: 165)
During physical exertion, atomic oxygen compounds from inside the mitochondria launches, such as H2O2, OH, and O; is called free radicals which have ionic oxidation properties; which is the oxidation of unsaturated fats and are usually found on cell walls.
During physical exertion cellular walls are damaged leading to increased free radicals outputs the most important of which is MDA (Malondialdehyde). The more MDA in the blood, the more the cellular fatigue, this means the occurrence of fatigue and stress, which may lead to inflammation of the working muscles. (10) (18)
Nahed Mohamed Wahba and others (2013) mentions that the increase in oxygen consumptions during practicing exercises increases the production and composition of free radicals that can be reduced through the consumption of adequate amounts of food containing adequate amounts of antioxidants. (6)
The body's muscles need vitamins; the need to it increases when performing sports activity and it is obtained through food; it plays an active role in many vital processes of metabolism, enzymes composition and energy generation during muscle work (4:47)
Several stimuli have been used to increase the ability to improve performance, Adel Rushdie (2003) pointed out the presence of two main factors that helps in enroll record numbers they are; the improved meal and stimuli that helps increase performance and delay appearance of fatigue. (5: 3) (12)
Abo El Ella Abd El Fattah and Hazem Hassan Salem (2011) points out the need of the swimmers to increase the amounts of vitamins E, A and C because they are antioxidants and help swimmers continue to perform high intensity exercises as it reduces fatigue with compensation of damaged tissue. (1: 187)
Oranges contain antioxidant ten times more than what was previously believed, it is to guide the measurement of antioxidants in fibers that is being absorbed by the intestines that

contains flavonoids, this substance is classified as antioxidants. David Gutierrez (2014) noted that this substance has a stronger effect than vitamin C on delaying fatigue appearance, preventing or delaying some cells damage, improving the performance of blood circulation, prevent from high blood pressure, lower the level of high adrenaline in the blood, regulates muscle work in the body, prevent clotting and it's considered the substance responsible for the activity of the entire body. (11) (14)

Ezzat Hussein, and Farouk Shahin (2005) mentions that one cup of orange juice compensates for the body's loss of potassium in a liter or one and a half liters of fluids during physical exertion and maintains the level of hemoglobin in the body. (3: 325)

Orange contains many vitamins such as B, E, A, C and mineral salts such as calcium, potassium, magnesium, zinc, iron and some acids such as folic acid and lipoic acid, all these components are involved in helping to produce energy from muscle cells, regulate muscle movement, regulate heartbeat, adjust the transmission of nerve impulses, activate the enzymes that are responsible for delivering signals inside and outside neurons and muscle cells that are responsible for respiratory action and energy production of muscles represented in ATP molecules. (13) (2: 43-46) (9: 170-171)

Liu Daduo and others (2011) point out that when eating orange and supplying the body with vitamin C, the antioxidant flavonoids lead to the refrain or reduction of the free radicals activity and prevents the cell wall from oxidation, this reduces the muscles fatigue and gives the muscles greater chances to bear the burden on them as well as works on improving muscle function and efficiency (10)

The human body also has a substance called glutathione; it is present in the blood and is produced from three amino acids (glutamic, cysteine and glycine). It is symbolized by GSH when it is reduced, and when oxidized it is symbolized by GSSG. This substance acts as enzymatic and antioxidant property to protect cells from the harm of the free radicals and it's important for the safety of red blood cells, making proteins, fatty membranes, etc. which means that it's presence delays muscle fatigue appearance during athletic effort and maintains the safety of muscle and nervous cells from rupture. (9: 165, 166) (15)

Boris Nemzer and others (2013) mentioned that alongside these acids there are some important compounds for the formation of glutathione and it also helps in its working process, including vitamins C, E, B1, B2, B6, B12, next to the selenium salts, magnesium and zinc in addition to the lipoic acid, all of which are found in oranges. These components are the function is presented in directing the cysteine acid to form glutathione, and the contribution of the interaction of three amino acids to form glutathione. Restoring the activity of the reduced glutathione from oxidative glutathione while acting as antioxidant maintains the glutathione rate and maintains the rate and proportion of the reduced and oxidized glutathione, it also increases the production of glutathione in case of needing to increase the activity of antioxidants. It also activates the enzymes that affect the glutathione during the antioxidants action. Without the help of these vitamins and minerals, all the previous steps are negatively affected and take a long time to occur, resulting in weak resistance to oxidation, resistance to toxins and immunity weakness in general. In contrast, glutathione itself has a role in maintaining these vitamins and make them work in a better way and in case of its reduction it leads to cells weakness, increase disease infection and destroying it. (7)

Vitamin B and C work together to speed up the formation of glutathione strongly and in a short time, Vitamin B activates the enzymes forming glutathione and contributes in the formation of glutathione fraction from its essential acids. Vitamin C acts as an antioxidant in the rapid formation of glutathione and also restores its activity through helping to transform it from the oxidizing to the reducing image; vitamin C also has the ability to reconfigure vitamin A and Lipoic Acid, which are necessary for glutathione work. (9: 166-168) (7) (19)

Through the researchers' job as an instructor in the water sports training department and her commitment to teach the fourth year students specialized in swimming, she noticed that after they pass the three years in college learn many skills and did not undergo any swimming high intense training programs. Furthermore the containing of their practical approach on physical and muscular burden presented in preforming of the four swims for 50 m long in time, in addition to measuring the endurance of the largest number of repetitions for 3 minutes, which requires continuous training to achieve the required skill level in terms of performance and time. The researchers noted through observing the students of the specialization that they get infected with fatigue, tiredness and muscles strain during training, which can cause them injury that affects their overall performance. This prompted the researchers to use food catalyst (oranges) because of its nutritional importance by containing vitamin C and antioxidants that maintains the muscles safety and works on delaying fatigue appearance and continue to perform the skill during exerting effort in sports. It also contains vitamins, minerals and nutrients catalyst to produce energy from the working muscles during physical exertion.

Research aims:

This research aims to identify the effect of the use of oranges on:

Biochemical variables (Vitamin C or Acid Ascorbic- glutathione GSH- Vit B2- MDA) of swimming specialized students.

Improving the skill level of crawl stroke, backstroke and breaststroke swims (50 m timing- 50 m performance) and enduring swimming for 3 min for swimming specialized students.

Research Hypothesis:

There are statistically significant differences between the averages of the pre and post measurements in the level of some biochemical variables (vitamin C or ascorbic acid - glutathione GSH - Vit B2 – MDA) of swimming specialized students for the experimental and control groups.

There are statistically significant differences between the averages of the pre and post measurements in the digital level of crawl stroke, backstroke and breaststroke swims (50 m timing- 50 m performance) and enduring swimming for 3 min for swimming specialized students for the experimental and control groups.

There are statistically significant differences between the post measurements of the experimental and control groups in the level of some biochemical variables (vitamin C or ascorbic acid - glutathione GSH - Vit B2 – MDA).

There are statistically significant differences between the post measurements of the experimental and control groups in the digital level of crawl stroke , backstroke and breaststroke swims (50 m timing- 50 m performance) and enduring swimming for 3 min.

Research Terminologies:

Antioxidants: Are those chemical compounds that if found in the diet at low concentrations can delay the appearance of oxidation with multiple mechanisms.(11)

Oxidation: A chemical reaction that converts electrons from a particular substance into an oxidizing factor that destroys cells (11)

Free radicals: Is an incomplete molecule containing oxygen that is single atom with unpaired electrons produced by metabolism and biological processes in the body.(20)

Glutathione: Glutathione peptide is composed of three amino acids (glutamic, cysteine and glycine). It is symbolized by GSH when it is reduced, and when oxidized it is symbolized by GSSG. This substance acts as enzymatic and antioxidant to protect cells from the harm of the free radicals. (17)

MDA (Malondialdehyde): It is a compound of atomic oxygen compounds (free radicals), which is usually produced on cell walls from within the mitochondria during

physical exertion, where cellular walls are damaged causing fatigue and tiredness that can lead to inflammation of the working muscles.

Research Procedures:

Research Methods:

The researchers used the experimental method using measurements (pre -post) on two groups (experimental - group), in order to suit the nature of this research.

Research community:

The students of the fourth year at the faculty of physical education for girls in Cairo for the academic year 2016-2017.

Research Sample:

The sample was selected in a purposive way from the students of the fourth year at the Faculty of Physical Education for Girls in Cairo for the academic year 2016-2017 specialized in swimming and their number was (14) students. The sample was divided into two equal groups, one of which is experimental that drinks orange juice as a catalyst for energy production 30 min before starting to practice swimming training according to the specialization requirements for the fourth and the other group is the controlled where the researchers applied the program only; each group contained (7) students.

Orange juice: It is prepared by squeezing the orange fruit containing the peel (which contains the largest amount of vitamin C and antioxidants; the most important is flavonoids), filter it and drink half an hour before training.

Sample selection conditions:

The students enrolled in the 4th year specialized in swimming.

Getting "very good" grade in the three swims specialty tests through a selection committee for the students of the specialization, consisting of three staff members from the water sports training department and have not less than three years of experience in teaching for students of the specialization. Attachment (2)

Research Sample Homogeneity:

The researchers conducted homogeneity between the research sample members in the following variables:

Height, weight and age. Attachment (4)

Biochemical variables (Vitamin C or Acid Ascorbic- glutathione GSH- Vit B2- MDA)

Timing and performance test for 50 m (crawl stroke, backstroke, and breaststroke) swims and enduring swimming for 3 min for a 12.5 m distance. Attachment (5)

Table (1) Statistical description of the research sample in the variables under study (n=12)

Variables		Measuring unit	Experimental group				Control group			
		$\bar{X}$	S	∝_3	Normality		Randomization		$\bar{X}$	
	S	∝_3	Normality		Randomization					
					Z	P (val	Z	P (val		Z
	P (val	Z	P (val							
Age	Year	19.30	0.55	0.88	0.92*	0.37	0.00*	1.00	19.38	0.78	-1.39
	0.55*	0.92	-0.46*	0.65							
Weight		Kg	163.17	2.64	0.32	0.42*	0.99	-0.46*	0.65	161.50	
	1.64	0.81	0.70*	0.71	0.88*	0.38					
Height	Cm	62.33	2.07	-0.05	0.50 *	0.96	-0.46*	0.65	62.50	1.87	0.00
	0.30*	1.00	0.00*	1.00							
Before effort		Ascorbic		Mg%	0.54	0.13	-0.21	0.48*	0.98	0.00*	1.00
	0.44	0.05	0.48	0.69*	0.72	0.00*	1.00				
	GSH	uM	887.83	141.42	0.71	0.51*	0.96	0.00*	1.00	893.17	143.40 -
0.34	0.74*	0.65	-0.46*	0.65							

	Vit B2	Ug/dl	14.00	3.41	-0.55	0.54*	0.93	0.00*	1.00	15.67	3.08	
	0.04	0.50 *	0.96	-0.46*	0.65							
	MDA	Mmol	23.63	3.43	-1.01	0.58*	0.89	0.00*	1.00	22.65	4.36	
	0.85	0.65*	0.79	0.46*	0.65							
After effort		Ascorbic		Mg%	0.35	0.08	-1.03	0.69*	0.73	0.00*	1.00	
	0.29	0.07	0.16	0.72*	0.67	0.46*	0.65					
	GSH	uM	962.33	135.04	0.64	0.70*	0.71	0.00*	1.00	963.50		
	106.00	-0.17	0.77*	0.60	-0.46*	0.65						
	Vit B2	Ug/dl	12.37	2.64	-0.46	0.68*	0.75	0.00*	1.00	13.27	2.17	-
0.33	0.57*	0.91	-0.46*	0.65								
	MDA	Mmol	37.77	5.82	0.98	0.72*	0.68	-0.18*	0.86	37.38	4.77	
	0.98	0.62*	0.83	0.46*	0.65							
Crawl stroke		Performance		Degree	7.17	0.41	-0.86	0.72*	0.68	1.37*	0.17	
	6.83	0.41	0.86	0.72*	0.68	0.46*	0.65					
	50 m	Sec	58.44	1.03	0.07	0.37*	1.00	0.00*	1.00	58.28	0.91	
	0.11	0.46*	0.99	0.46*	0.65							
Backstroke		Performance		Degree	7.25	0.27	0.00	0.78*	0.57	-0.46*	0.65	
	7.25	0.27	0.00	0.78*	0.57	-0.46*	0.65					
	50 m	Sec	63.32	8.32	2.27	0.85*	0.46	0.88*	0.38	60.99	3.12	
	0.91	0.89*	0.41	0.46*	0.65							
Breaststroke		Performance		Degree	7.17	0.41	-0.86	0.72*	0.68	-1.37*	0.17	
	7.00	0.45	0.00	0.49*	0.97	0.00*	1.00					
	50 m	Sec	100.67	1.63	0.38	0.44*	0.99	0.00*	1.00	102.00	1.41	
	0.00	0.41*	1.00	-0.18*	0.86							
3 min endurance			Width	9.83	0.75	0.31	0.62*	0.83	0.00*	1.00	9.67	
	0.82	0.86	0.72*	0.68	0.46*	0.65						

* Significance (p) value < (0.05)

Table (1) shows the mean, standard deviation, and torsion coefficient of the research sample for the experimental and control groups. The data suggests that the torsion coefficient values of the research sample are limited to (+3) indicating that the sample data have no positive or negative torsion. The normal and random tests value indicates that the data is distributed normally and randomly in all the variables under study, which requires doing statistics in a normal way.

Research Sample Equivalence:

The researchers divided the research basic sample into two random groups each including (6) students, aiming to find equivalence between the experimental and control groups in the timing and performance level of 50 m (crawl stroke, backstroke, breaststroke) swims and enduring swimming for 3 mints for a 12.5 m distance and the biochemical variables (Vitamin C or Acid Ascorbic- glutathione GSH- Vit B2- MDA) under study as shown in table 2.

Table (2) the equivalence of the experimental and control group in the variables under study (n=12)

Variables	Measuring unit		Experimental group		Control group		F	P (value)
	T	P (value)						
		$\bar{X}$	S	$\bar{X}$				
	S							
Age	Year	19.30	0.55	19.38	0.78	1.52	0.25	0.71	9.00	
Weight		Kg	163.17	2.64	161.50		1.64	0.19	0.67	0.10	9.00
Height	Cm	62.33	2.07	62.50	1.87	0.32	0.58	-0.47	9.00		
Before effort		Ascorbic		Mg%	0.54	0.13	0.44	0.05	0.06	0.81	0.10

9.00										
GSH	uM	887.83	141.42	893.17	143.40	0.04	0.85	-0.29	9.00	
Vit B2	Ug/dl	14.00	3.41	15.67	3.08	0.18	0.68	-0.37	9.00	
MDA	Mmol	23.63	3.43	22.65	4.36	0.03	0.88	0.23	9.00	
After effort	Ascorbic		Mg%	0.35	0.08	0.29	0.07	0.22	0.65	-0.36
9.00										
GSH	uM	962.33	135.04	963.50		106.00	0.05	0.82	-0.29	9.00
Vit B2	Ug/dl	12.37	2.64	13.27	2.17	0.08	0.78	-0.33	9.00	
MDA	Mmol	37.77	5.82	37.38	4.77	0.01	0.92	0.27	9.00	
Crawl stroke	Performance		Degree	7.17	0.41	6.83	0.41	1.20	0.30	-0.62
9.00										
50 m	Sec	58.44	1.03	58.28	0.91	0.05	0.83	0.43	9.00	
Backstroke	Performance		Degree	7.25	0.27	7.25	0.27	0.20	0.66	-0.30
9.00										
50 m	Sec	63.32	8.32	60.99	3.12	0.23	0.64	0.16	9.00	
Breaststroke	Performance		Degree	7.17	0.41	7.00	0.45	0.01	0.93	-0.38
9.00										
50 m	Sec	100.67	1.63	102.00	1.41	0.07	0.80	-0.51	9.00	
3 min endurance		Width	9.83	0.75	9.67	0.82	0.01	0.91	0.27	9.00

*Significance (p) value < (0.05)

Table (2) shows that there are no statistically significant differences in the values of F tests, indicating the homogeneity of the experimental and control groups. Also there are no statistically significant differences in the values of the T tests indicating the equivalence of the sample members in all the variables under study.

Data collecting tools:

Data collecting tools and means:

First: Applications:

Expert Opinion Survey Form. Attachment (3)

The researchers designed a questionnaire for experts' opinions, whose names are listed in Attachment 1, as follows:

Suggested duration for research application.

Measurement of Skill performance level test.

Registration form for the research sample. Attachment (4)

Second: Equipment's and tools:

Restameter to measure length for nearest cm.

Weight scale; to measure weight for nearest kg.

Stop watch to measure timing for the nearest 0.01 sec.

Training tools used (floating boards- legs fins- breaststroke fins- weights for arms, legs and torso- hand paddles)

Third: Tests and Measurements:

Physical Measurements:

Measuring height in meters.

Measuring weight in kilograms. Attachment (4)

Digital level measurements:

Skill tests were presented to the experts in its initial form. Attachment (3) 80% of their opinions reached the following:

Timing of 50 m crawl stroke.

Timing of 50m backstroke.

Timing of 50 m breaststroke.

Continuous freestyle swimming for 3min.

These test were agreed upon by the experts according to the requirements of the fourth year, where the main aim of the researchers was to improve the digital level, delay the fatigue appearance and helping the students to pass the applied test (50 m crawl stroke- 50 m backstroke- 50 m breaststroke- 3 min endurance) with high efficiency level, since some of these students have learned to swim in college without previous experience, while others were swimming practitioners since childhood. This made the researchers start with improving the general endurance and gradually develop special endurance (strength endurance and periodic respiratory endurance) and then develop speed through gradually increasing intensity and decreasing distance, and then evaluate it by measuring the 50 m swim. Attachment (5)

The tests were implemented by a committee consisting of consisting of three staff members from the water sports training department and have not less than three years of experience in teaching for students of the specialization. Attachment (2)

Fourth: Exercises

This training aims to improve the timing and performance level of crawl stroke, backstroke and breaststroke swims and enduring swimming for 3 min for12.5 m distance. This is done in accordance with the plan through using exercises agreed upon by the water sports training department, faculty of physical education for girls in El Gezira the researchers are affiliated to, through using a specific booklet that includes arms and legs, endurance for the three swims (crawl stroke, backstroke, and breaststroke), and start and turn exercises for each swim. This booklet is updated each year according to the latest trainings that are assembled from the internet and modern books by students and the instructors who teach.

Teaching for the fourth year is done by four teaching staff and two teaching assistance in the department according to the schedule and the researchers were among the members whom participated in teaching this year. The fourth year has 8 lectures per week divided over three days; by making two lectures for practical performance in water and it's duration is 45 minutes, hence the total duration is 90 minutes. The third day will include two lectures in which they analyze the kinetic of the three swims, watch videos about the performance of these swims and view the modern training to develop the performance. Also they perform exercises outside the water to improve fitness.

The foundation of Setting Exercises:

Training exercises should be suitable for the training phase of the research sample.

The training should achieve the aims for which it was developed, to improve the skill and digital levels of crawling stroke, backstroke and breaststroke swims.

The training is characterized by its flexibility, in order to be modified if necessary.

Training duration:

The researchers surveyed the opinions of 5 experts who have at least 5 years' experience in teaching the swimming specialization students in the faculty in attachment (1) in the research application duration on the students Attachment (3), and it was agreed by 80% to the following:

The experiment duration (8) weeks.

Number of units (24); (3) units per week.

The unit duration (90) min, in accordance with the plan of the department water sports training department in the faculty.

The time distribution of the training unit for the two research groups, (90) minutes were divided as follows:

(15) min; changing clothes, and following up the attendance and absence of the students.

(10) min; warming up.
(45) min; the main part.
(5) min; recovery.
(15) min; getting out of the water and changing clothes.

The researchers took into account to teach the same trainings that were taught to the experimental and controlled groups at the same time and under the same conditions to adjust the variables that may affect the results of the research. Attachment (6)

Skills tests scientific procedures:

The researchers applied the scientific procedures on the sample of the exploratory study as follows:

Validity:

The researchers used the validity of identification method by applying the tests on a sample of (10) students from (the research community) and from outside the basic sample (fourth year students that are not enrolled in the swimming specialization) then they divided it into two groups, one of them is distinctive in performance and timing of the three swims and the other is non-distinctive as shown in table (3)

Table (3) The significance differences between the measurements of the pilot sample (distinctive and indistinctive) in all the variables under study to calculate the validity of identification (n=10)

Variables	Measuring unit		Distinctive (5)		Indistinctive (5)		T	P (value)
		$\bar{X}$	S	$\bar{X}$	S			
Crawl stroke	Performance	Degree	10.00	0.00	7.11	0.31	31.72*	0.00
50 m	Sec	37.00	3.15	58.57	1.03	-17.85*		0.00
Backstroke	Performance	Degree	9.63	0.25	7.55	0.37	11.44*	0.00
50 m	Sec	48.13	6.94	63.31	6.55	-13.61*		0.01
Breaststroke	Performance	Degree	10.00	0.00	7.23	0.57	22.39*	0.00
50 m	Sec	63.1	8.88	100.67	1.63	-16.85*		0.00
3 min endurance		Width	14.75	1.71	9.83	0.75	25.23*	0.00

*Significance (p) value < (0.05)

Table (3) shows that there are statistically significant differences between measurements of the pilot study (distinctive and indistinctive), which proves the validity of identification in all the variables under study.

Stability

The researchers applied the skill tests and then re-applied them after a period of one week from the first application as shown in Table (4).

Table (4) the torsion coefficient between the measurements of the pilot sample in all the variables under study to calculate stability

Variables	**Measuring unit**		**1st measurement**		**2nd measurment**		**R**	**P (value)**
		$\bar{X}$	S	$\bar{X}$	S			
Crawl stroke	Performance	Degree	7.11	0.31	7.10	0.21	0.92*	0.00
50 m	Sec	58.57	1.03	58.56	1.01	0.93*	0.00	
Backstroke	Performance	Degree	7.55	0.37	7.56	0.35	0.81*	0.02
50 m	Sec	63.31	6.55	63.35	6.51	0.71*	0.02	
Breaststroke	Performance	Degree	7.23	0.57	7.33	0.58	0.92*	0.00

50 m	Sec	100.67	1.63	100.60	1.67	0.92*	0.00
3 min endurance		Width	9.83	0.75	9.80	0.70	0.98* 0.00

*Significance (p) value < (0.05

Table (4) show that there is a statistically significant torsion coefficient between the pilot sample measurements, which proves the stability of the tests for all the variables under study.

Research executive steps:

Pilot study:

The pilot study was conducted on (10) students from the research community and outside the basic sample divided into (5 fourth year students that are distinguished swimmers that are not enrolled in the swimming specialization) as a distinctive group and (5 fourth year students that are not enrolled in swimming specialization) as indistinctive group and that was done in the period from Saturday 1/10/2016 to Wednesday 5/10/2016 with the aim of:

Identify the time spent to perform measurements.

Identify the obstacles that may encounter the researchers during the implementation of the original experiment.

Ensure the suitability of the tools and exercises for the research sample.

Conduct scientific procedures (validity of identification, stability) for physical and skill tests.

Pre Measurements:

The pre measurement was conducted in the faculty of physical education for girls in El Gezira swimming pool as follows:

Evaluate the skill and digital performance of crawl stroke, backstroke and breaststroke swims and enduring swimming for 3 min for12.5 m distance for the experimental and control groups on Saturday, 8/10/2016 through a committee consisting of three staff members from the water sports department at the Faculty of Physical Education in Cairo, and has applied a form to evaluate performance level. Attachment (--)

Taking two blood samples from each student; one before performing the skill tests (before exerting effort) and the other right after finishing the skill tests (after exerting effort) to measure the level of Biochemical variables (Vitamin C or Acid Ascorbic- glutathione GSH- Vit B2- MDA) for the experimental and control groups.

Research experiment execution:

The program was implemented in its final form from 9/10/2016 to 8/12/2016 for 8 weeks duration.

Post measurements:

After completing the implantation of the program, the post measurements were conducted:

Evaluating the skill and digital performance of the three swims and enduring swimming for 3 min on Saturday, 10/12/2016.

Taking two blood samples from each student; one before performing the skill tests (before exerting effort) and the other right after finishing the skill tests (after exerting effort) to measure the level of Biochemical variables (Vitamin C or Acid Ascorbic- glutathione GSH- Vit B2- MDA) for the experimental and control groups.

The used Statistical treatments:

The researchers will use SPSS program to calculate the following statistical treatments:

Arithmetic mean ($\bar{X}$).

Standard Deviation (S).

Torsion Coefficient (∝_3).

Normal distribution test Kolmogorov-Smirnov (Z).

Randomization Test (Z) Runs Test.

(F) Test.
Correlation coefficient (r).
Improvement rates.
Significance differences test.

Results presentation and discussion:

First: Results presentation

Table (5) the significance differences between the pre and post measurements of the experimental group in some biochemical variables level (n=6)

Variables	Measuring unit	Pre measurement		Post measurement		Diff.	T	P (value)	Improvement rate
		$\bar{X}$	S	$\bar{X}$	S				
Before effort	Ascorbic	Mg%	0.54	0.13	0.82	0.06	0.28	-11.05*	0.00	%34.45
GSH	uM	887.83	141.42	901.00	116.14	13.17	-0.12	0.91	%1.46	
Vit B2	Ug/dl	14.00	3.41	14.97	2.86	0.97	0.39	0.72	%6.46	
MDA	Mmol	23.63	3.43	20.27	1.44	3.36	1.16	0.30	%16.60	
After effort	Ascorbic	Mg%	0.35	0.08	0.50	0.08	0.15	-3.88*	0.01	%30.00
GSH	uM	962.33	135.04	997.00	167.75	34.67	-0.50	0.64	%3.48	
Vit B2	Ug/dl	12.37	2.64	14.07	2.61	1.70	-0.58	0.59	%12.08	
MDA	Mmol	37.77	5.82	31.95	2.07	5.82	2.68*	0.04	%18.22	

*Significance (p) value < (0.05

Table (5) shows statistically significant differences between the pre and post measurements of the experimental group in (Ascorbic) before and after the effort, (MDA) after the effort, and in favor of the post measurements. There are no statistically significance differences in the other variables.

Figure (1) the improvement rate in the pre measurements exceeded the post measurements in some biochemical variables before and after effort. There was also an increase in the improvement rate of all variables after effort than before effort except for (Ascorbic)

Table (6) Significance differences between the pre and post measurements of the experimental group in the swimming skill level (n=6)

Variables	Measuring unit	Pre Measurements		Post Measurements		Diff.	T	P (value)	Improvement rate
		$\bar{X}$	S	$\bar{X}$	S				
Crawl stroke	Skill Performance	Degree	7.17	0.41	9.58	0.38	2.41	-29.72*	0.00	%25.18
50 m	Sec	58.44	1.03	53.44	0.78	5.00	13.85*	0.00	%9.36	
Backstroke	Skill Performance	Degree	7.25	0.27	9.58	0.38	2.33	-9.44*	0.00	%24.35
50 m	Sec	63.32	8.32	53.58	0.89	-9.74	4.61*	0.01	%18.17	
Breaststroke	Skill Performance	Degree	7.17	0.41	9.50	0.45	2.33	-19.36*	0.00	%24.53
50 m	Sec	100.67	1.63	73.50	4.85	27.17	13.82*	0.00	%36.97	
3 min endurance	Width	9.83	0.75	15.67	0.52	5.84	-23.24*	0.00	%37.26	

*Significance (p) value < (0.05

Table (6) shows that there are statistically significant differences between the pre and post

measurements of the experimental group in the swimming skill level in favor of the post measurements.

Figure (2) the improvement rate in the pre measurements exceeded the post measurements in the swimming skill level.

Table (7) the significance differences between the pre and post measurements of the experimental group in some biochemical variables level (n=6)

Variables	Measuring unit	Pre measurement		Post measurement		Diff.	T	P (value)	Improvement rate
		$\bar{X}$	S	$\bar{X}$	S				
Before effort	Ascorbic	Mg%	0.44	0.05	0.64	0.06	0.20	-8.56*	0.00 %31.07
GSH	uM	893.17	143.40	856.67	142.53	-36.50	3.22*	0.02	%-4.26
Vit B2	Ug/dl	15.67	3.08	15.77	2.72	0.10	-0.44	0.68	%0.61
MDA	Mmol	22.65	4.36	18.87	4.48	3.78	3.30*	0.02	%20.05
After effort	Ascorbic	Mg%	0.29	0.07	0.38	0.08	0.09	-1.46	0.20 %23.11
GSH	uM	963.50		106.00	944.50		121.76	-19.00	0.63 0.56 %-2.01
Vit B2	Ug/dl	13.27	2.17	13.87	1.98	0.60	-1.49	0.20	%4.30
MDA	Mmol	37.38	4.77	30.48	4.21	6.90	3.55*	0.02	%22.62

*Significance (p) value < (0.05

Table (7) shows that there are statistically significant differences between the pre and post measurements of the control group in Ascorbic before the effort, in favor of the post measurement, GSH before the effort in favor of the pre measurement and MDA before and after the effort in favor of post measurement, and there were no statistically significant differences in the other variables.

Figure (3) the improvement rate in the pre measurements exceeded the post measurements in the experimental group in some biochemical variables. There was also an increase in the improvement rate of all variables after the effort than before the effort except for Ascorbic, (GSH).

Table (8) Significance differences between the pre and post measurements of the experimental group in the swimming skill level (n=6)

Variables	Measuring unit	Pre measurements		Post Measurements		Diff.	T	P (value)	Improvement rate
		$\bar{X}$	S	$\bar{X}$	S				
Crawl stroke	Skill Performance	Degree	6.83	0.41	8.00	0.32	1.17	-4.72*	0.01 %14.63
50 m	Sec	58.28	0.91	54.23	0.60	4.06	7.52*	0.00	%7.48
Backstroke	Skill Performance	Degree	7.25	0.27	8.08	0.38	0.83	-7.91*	0.00 %10.31
50 m	Sec	60.99	3.12	55.44	0.68	5.55	4.11*	0.01	%10.00
Breaststroke	Skill Performance	Degree	7.00	0.45	7.92	0.38	0.92	-3.38*	0.02 %11.58
50 m	Sec	102.00	1.41	85.33	1.37	16.67	17.46*	0.00	%19.53
3 min endurance	Width	9.67	0.82	12.67	0.82	3.00	-11.62	0.00	%23.66

*Significance (p) value < (0.05
Table (8) shows statistically significant differences between the pre and post measurements of the control group in the swimming skill level in favor of the post measurements.

Figure (4) the improvement rate in the pre measurements exceeded the post measurements in the experimental group in the swimming skill level.

Table (9) Significant differences between the post measurements of the experimental and control groups in some biochemical variables level (n=6)

Variables	Measuring unit	Experimental		Control		Diff.	T	P (value)	Improvement rate
		X¯	S	X¯	S				
Before effort	Ascorbic	Mg%	0.82	0.06	0.64	0.06	0.19	5.37*	0.00	%22.52
	GSH	uM	901.00	116.14	856.67	142.53	44.33	0.59	0.57	%4.92
	Vit B2	Ug/dl	14.97	2.86	15.77	2.72	-0.80	-0.50 م	٠,٦٣	%-٥,٣٥
	MDA	Mmol	20.27	1.44	18.87	4.48	1.40	0.73	0.48	%6.91
After effort	Ascorbic	Mg%	0.50	0.08	0.38	0.08	0.12	2.62*	0.03	%24.57
	GSH	uM	997.00	167.75	944.50		121.76	52.50	0.62	0.55	%5.27
	Vit B2	Ug/dl	14.07	2.61	13.87	1.98	0.20	0.15	0.88	%1.45
	MDA	Mmol	31.95	2.07	30.48	4.21	1.47	0.77	0.46	%4.59

*Significance (p) value < (0.05
Table (9) shows statistically significant differences between the post measurements of the experimental and control groups in Ascorbic before and after the effort in favor of the experimental group and there were no statistically significant differences in the other variables.

Figure (5) the improvement rate of the post measurements of the experimental and control groups in some biochemical variables level. There was also an increase in the improvement rates of all variables after the effort than before the effort in favor of the experimental group except for the (MDA).

Table (10) Significant differences between the post measurements of the experimental and control groups in the swimming skill level (n=6)

Variables	Measuring unit	Pre measurements		Post Measurements		Diff.	T	P (value)	Improvement rate
		X¯	S	X¯	S				
Crawl stroke	Skill Performance	Degree	9.58	0.38	8.00	0.32	1.58	28.03*	0.00	%16.52
	50 m	Sec	53.44	0.78	54.23	0.60	-0.79	1.97	0.08	%1.48
Backstroke	Skill Performance	Degree	9.58	0.38	8.08	0.38	1.50 م	٦,٩٠*	٠,٠٠	%١٥,٦٥
	50 m	Sec	53.58	0.89	55.44	0.68	-1.86	4.07*	0.00	%3.47
Breaststroke	Skill Performance	Degree	9.50	0.45	7.92	0.38	1.58	6.64*	0.00	%16.67
	50 m	Sec	73.50	4.85	85.33	1.37	-11.83	5.76*	0.00	%16.10
3 min endurance		Width	15.67	0.52	12.67	0.82	3.00	7.61*	0.00	%19.15

*Significance (p) value < (0.05
Table (10) shows statistically significant differences between the post measurements of the experimental and control groups in all swimming skill levels and it is in favor of the experimental group. There were no statistically significant differences between the post measurements of the experimental and control groups in (50 m) performance timing for crawl stroke.

Figure (6) the improvement rate of the post measurements of the experimental and control groups in the swimming skill level.
Second: Results discussion:
The researchers compared the differences results between the means of the pre and post measurements in physiological and skill performance variables of 50 m crawl stroke, backstroke and breaststroke swims and enduring swimming for 3 min in favor of the post measurements of the sample under study. The researchers used the significant difference between Means test (T-test), and a test to measure the improvement rate on the pre and post measurements. This was to identify the improvement rate of the research variables which was in favor of the post measurements after using oranges and the proposed program and to identify the statistical significant differences between the pre and post measurements means.
Table (5) and figure (1) shows that there are statistically significant differences in some biochemical variables between the pre and post measurements of the experimental group before effort in favor of post measurements. Ascorbic Acid levels have increased significantly due to the consumption of oranges, as well as its peel that contains high amounts of vit. C or ascorbic acid during the research implementation period resulting in a high concentration, as well as increased rates of GSH, which are increased in the presence of Ascorbic Acid as a catalyst. As for Vit B2 it increased even if was not to a degree that is statistically significant; this is due to the diversity of sources that it can be taken from such as vegetables, which contain a large amount of it.
After the effort, there were statistically significant differences in Ascorbic Acid rates in favor of post measurements, where its rates decreased after the effort than before the effort, which gives the opportunity to increase its rates of interactions with radicals, which increases with repeated effort (training program). While GSH increased for the same reason which is increasing its production to fight the radicals that was resulted during effort, causing the muscle work performance more efficiently. Vit B2 lessens to increase the production of the coenzyme called FAD (flavin adenosine dinucleotide) which acts as a hydrogen catalyst during the oxidation reactions and reduction. It also works with oxidative and reduction enzymes that are active during effort.
The final result is that there are statistically significant differences in the reduction of MDA after the effort in favor of post measurements to increase the activity of the antioxidant system in general, resulting in increasing the needed time to reach fatigue and the ability to continue performing longer and more efficiently.
This result was in agreement with what Liu Daduo and others (2011) that when eating orange and supplying the body with vitamin C, flavonoids anti-oxidation leads to the stopping or reduction of the free radicals activity, the most important of which is MDA (Malondialdehyde) which leads to the preservation of the cell wall from Oxidation so it reduces muscle fatigue and gives greater chances for muscles to bear the burden on them. It also works to improve muscle function and efficiency. (10)
This achieves the validity of the first hypothesis that stated; there are statistically significant differences between the averages of the pre and post measurements in the level of some biochemical variables (vitamin C or ascorbic acid - glutathione GSH - Vit B2 – MDA) of swimming specialized students for the experimental and control groups.

These results agreed with the results of the skill performance in table (6) and figure (2) indicating that there are statistically significant differences between the pre and post measurements of the experimental group in the swimming skill level in favor of the post measurements. Abo El Ella Abd El Fattah and Hazem Hassan Salem (2011) pointed the swimmers need to increase vitamin C levels as antioxidants, which helps them to continue performing high-intensity exercises as it reduces fatigue and compensate the damaged tissue. (1: 187)

The researcher attributed these results to the used exercises, the use of orange as a catalyst for activity performance and delay fatigue appearance.

This achieves the validity of the second hypothesis that stated; There are statistically significant differences between the averages of the pre and post measurements in the digital level of crawl stroke, backstroke and breaststroke swims (50 m timing- 50 m performance) and enduring swimming for 3 min for swimming specialized students for the experimental and control groups.

Table (7) and figure (3) shows that there are statistically significant differences between the pre and post measurements of the control group in Ascorbic before the effort, in favor of the post measurement, GSH before the effort in favor of the pre measurement and MDA before and after the effort in favor of post measurement, and there were no statistically significant differences in the other variables. Ascorbic increases during rest time because it is consumed during effort to be protected from free radicals; while GSH increases for the same reason which is it increases its production to fight the resulting radicals during effort. Ascorbic presence increases GSH production within the muscle cell.

There were statistically significant differences after the effort between the pre and post measurements of both Vit C and GSH because of the insufficient stock of them in the muscles in the blood which work during physical activity to protect blood from free radicals. MDA presence increased in the blood indicating the increase in cellular walls rapture which led to the appearance of muscle fatigue on students. The researchers attributed the results to the absence of the catalyst (orange), which increases the production of GSH, which fights the production of free radicals presented in MDA.

This is in line with what Liu Daduo and others (2011) said that during physical effort cellular walls are raptured leading to the increase of radical's remaining's the most important of which MDA. The more MDA is in the blood, the more the cellular rapture, meaning the occurrence of fatigue and tiredness which can lead to working muscles inflammation. (10)

This achieves the validity of the third hypothesis that stated; there are statistically significant differences between the post measurements of the experimental and control groups in the level of some biochemical variables (vitamin C or ascorbic acid - glutathione GSH - Vit B2 – MDA).

Table (8) and Figure (4) shows there are statistically significant differences between the pre and post measurements of the control group in the swimming skill level in favor of the post measurements; this was due to the punctuality of the control group to the skill performance exercises during the application period for both groups simultaneously and at the same time.

Table (9) shows statistically significant differences between the post measurements of the experimental and control groups in Ascorbic before effort in favor of the experimental group and there were no statistically significant differences in the other variables. The Ascorbic Acid levels have increased significantly due to the consumption of oranges, as well as its peel that contains high amounts of vit. C or ascorbic acid during the research implementation period resulting in a high concentration, as well as increased rates of GSH, which are increased in the presence of Ascorbic Acid as a catalyst and antioxidant. Don Maclaren, Neil Spurway (2007) mentioned that glutathione that is present in the blood and is produced from three amino acids (glutamic, cysteine and glycine). It is symbolized by GSH when it is

reduced, and when oxidized it is symbolized by GSSG. This substance acts as enzymatic and antioxidant. (9: 165, 166)

Boris Nemzer and others (2013) mentioned that alongside these acids there are some important compounds for the formation of glutathione and it also helps in its working process, including vitamins C, E, B1, B2, B6, B12, next to the selenium salts, magnesium and zinc in addition to the lipoic acid, all of which are found in oranges. These components are the function is presented in directing the cysteine acid to form glutathione, and the contribution of the interaction of three amino acids to form glutathione. Restoring the activity of the reduced glutathione from oxidative glutathione while acting as antioxidant and without the help of these vitamins and minerals, all previous steps are negatively affected and take longer time to occur, resulting in weak oxidation processes. (7)

After effort, ascorbic rates decreased after the program than before the program, this is due to increase their reaction rates with the radicals which increase with repeated effort (training program) while GSH rates increased even if not in a significant way and that was due to using it to react with radicals. Don Maclaren, Neil Spurway (2007) mentions that its presence is important to protect cells from free radical damage and delay the muscle fatigue appearance during athletic effort, maintain the muscle's safety and nervous cells from rapture. (9: 165, 166)

Vit B2 rates were not affected nearly for the same as the previous reasons, MDA production rates declined after effort in the experimental group than in the control group after the program and that's because of the activity increase of the antioxidant system in general as a result of eating orange.

Figure (5) shows increase in the improvement rates of all variables of the experimental group over the control group after the effort before the effort except for MDA. The researchers attributed this increase to the orange juice in addition to its peel that the experimental group drunk during the entire application period, which increased the concentration of these variables and stimulated the increase in the activity of the antioxidant system to reduce the rate of (MDA) that causes damage and destruction of cellular walls.

These results agreed with the results of the digital and skill level in both table (10) and Figure (6), where there are statistically significant differences between the post measurements of the experimental and control groups in all swimming skill level in favor of the experimental group. There are also statistically significant differences between the experimental and control groups in the (50 m) crawl stroke digital level in favor of the experimental group.

The researchers attributed the results to the improvement in the biochemical variables of the experimental group students that drunken orange juice, in addition to its peel, before 30 min of starting training during the entire application period. This led to an increase in muscle activity, reduced the free radicals work and increased the activity of the antioxidant system, helping reduce fatigue appearance and preventing or delaying the damage of muscles and nervous cells, leading to an improvement in the skill level of the experimental group over the control group.

This achieves the validity of the fourth hypothesis that stated; There are statistically significant differences between the post measurements of the experimental and control groups in the digital level of crawl stroke, backstroke and breaststroke swims (50 m timing-50 m performance) and enduring swimming for 3 min.

Conclusion:

From the results that the researchers reached and within the limits of the research sample they concluded the following:

There are statistically significant differences between the post measurements of the experimental and control groups in the level of some biochemical variables (vitamin C or ascorbic acid - glutathione GSH - Vit B2 – MDA) in favor of the experimental group.

There are statistically significant differences between the post measurements of the experimental and control groups in the digital level of crawl stroke, backstroke and breaststroke swims (50 m timing- 50 m performance) and enduring swimming for 3 min in favor of the experimental group.

Recommendations:

In light of the research results and the limits of the sample, the researcher recommends the following:

The use of oranges before training delays the fatigue appearance and improves the skill level of swimming specialized students.

The trainers' attention to the swimmers nutrition side, especially eating orange before the starting of the training to contribute in improving the skill level.

Conduct other studies on nutrition that delay fatigue appearance and improve the skill level of swimmers.

Conduct other studies on oranges for other sports.

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